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PCIe Protocol Suite™ 7.00 Release Notes

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1. Overview

This Read Me file contains last-minute product information for the PCIe Protocol Suite™ software for Microsoft Windows. For full instructions on using the software and the hardware, please see the User's Manual and other documents provided with this product.

2. System Requirements

The following is a list of recommendations for the host machine that runs the PCIe Protocol Suite application and that is connected to the Summit systems.
For optimal performance, it is recommended that the software is installed and operated on a host machine that is of a recent generation of personal computers architecture. However, the software should also operate on machines that are below the minimum requirements specified here, at the cost of slower performance, provided that memory, storage and display requirement are kept.

2.1. Software

Operating System:

- Windows 8 (x86 and x64), Windows Server 2012 (x64), Windows 7 (x86 and x64), Windows Server 2008R2 (x64), Windows XP (x86).

- The latest Service Pack available for the Windows OS in use is required.
- It is recommended that you use one of the supported 64-bit Windows versions listed above as they allow using more RAM than the 32-bit ones.

Required applications:
Microsoft Internet Explorer, version 6 or newer. To view the manuals, datasheets and other documents, you would need to install 'Adobe Acrobat Reader' (http://get.adobe.com/reader).

2.2. Hardware

Memory (RAM):
This software application may use up to 4GB of the RAM in the host machine. For improved performance of the software, it is recommended that 16GB of RAM is installed on the host machine. Memory as little as 2GB would still allow the software to function, but would limit its performance and user experience.

Non-volatile Storage (SDD or Hard Disk):
- Storage space of 200MB is required for installing the PCIe Protocol Suite software on the host machine.
- Additional storage space is needed for the operation of the software application and for storing recorded data in files.
- Please remember that storing large captured traces can result in multiple gigabytes of file sizes and can quickly fill your available storage space.

Display:
- To take full advantage of the rich visualization and analysis of Teledyne LeCroy software it is recommended that the display is set to at least 1050 lines of vertical resolution with at least 24-bit color depth.
- The minimum requirement for the display is a resolution of 1024x768 with at least 16-bit color depth.

Connectivity:
- It is recommended that a Gigabit (1000Mbps) Ethernet or a USB3.0 link is used for the connection with the Summit analyzers.
- At minimum the host machine should have either a 100/1000Mbps Ethernet connection to the network or a USB2.0 port.
- If multiple analyzers are daisy chained and connected to the same host machine, one Ethernet connection or one USB port is required for each analyzer.
- Please note that there is no connectivity requirement if the analysis application is used to only view pre-recorded traces.
- For tips as for how to improve on the performance of the Teledyne LeCroy analysis system and more specifically on the performance of the software, please refer to the User Manual.

3. Release Notes

3.1. What's New

- Spreadsheet view supporting storage decodes for NVMe, AHCI and ATA.
- Search functionality for NVMe and ATA commands in decoded traces.
- Trigger options for NVMe, AHCI and ATA commands.
- Option ROM capability added to Z3 Trainer.
- Storage scripts for Z3 Trainer NVMe and AHCI structures.
- Bug fixes.

3.2. Notes

- Notes for PETracer Application
    - **Local Timers** – Timers defined in the sequencer states can only be controlled by events from either downstream or upstream directions but not both at the same time.
    - **Storage Command Emulation** – Refer to \Public\Documents\LeCroy\PETracer\Sample Files\Z3-16TrainerScripts for examples on how to create PQI/SOP commands. Dedicated commands will be added in future releases.
    - **Supported Products** – PETracer 7.00 application supports the following products: Summit, Summit T2-16, Summit Z2-16, Summit T3-16, Summit T3-8, Summit T28, Summit T24 and Summit Z3-16.
    - **NVMe Drive Emulation** – Drivers and instructions for different OS versions can be found at Users\Public\Documents\LeCroy\PETracer\Sample Files\Z3-16TrainerScripts\NVMe_DriveEmulation\Drivers. You can find more information about drive emulation in manual PETrainerScriptManual.pdf section 6.10 Config = NVMe. Specification level currently supported for NVMe drive emulation is 1.0c. Test and validation was performed only on Ubuntu 13.10.
    - **Storage Decodes Supported** – PETracer currently supports decoding for NVMe 1.0c, AHCI 1.3, ATA 2.6, PQI 6i and SOP Level 4.

3.3. Known Issues

- Known Problems and Issues PETracer Application
    - **CrossSync** – When using CrossSync with PETracer software and other Teledyne LeCroy protocol analysis software to capture and analyze two or more protocols, please make sure you set the capture buffer of the PCIe analyzer to a size of not more than 1GB. Failing to set the buffer size to this limitation would result in its inability to navigate through the PCIe trace.
    - **Bus Utilization View** – Bus Utilization View requires large amounts of memory during processing. In certain extreme cases, it will reach the memory limit required by the Windows Operating system on each application and an out-of-memory message box will pop up. Reducing the size of the trace file will help prevent this. To reduce the size of the trace file reduce the size of each recording or keep it the same size and check the "multi-segment" check-box in the recording options. If the out of memory message box pops up please close the bus utilization view to avoid faulting the PETracer application.
    - **Storage Decode Search** - At the “Find” dialog box, “Search for” drop down list, the new options “PQI Transactions” behave exactly like “Split Transactions”. This functionality will be enhanced in coming releases.
    - **CATC Walk Enhanced Markers playback of audio/video files** - On some systems, the PETracer application may not be able to playback audio/video files embedded in markers even if the appropriate media codecs are installed. The root cause is usually a 3rd-party application that installed a faulty filter that prevents the Microsoft DirectShow subsystem from loading the required audio/video filters. One known 3rd-party application that causes this problem is Corel WinDVD v10. The recommended solution is to uninstall Corel WinDVD v10 if it is not being used. If 3rd-party driver is not uninstalled, the PETracer application will issue a warning message when opening a trace.
    - **Transaction Level decode** – When decoding a CATC Trace for Link, Split or any storage commands, if the process is interrupted before the trace has been completely processed, the trace must be closed then re-opened to restart the decoding process. This will be corrected in future releases.
    - **NVME/PQI/AHCI/ATA Trace Decoding** – When generating multi segment traces, decoding is performed only for the first segment. User must export configuration information using Tools -> PCIe SSD Configuration -> Export Config Info, open the new segment and import the configuration information using Import Config button from this same dialog. Decoding will be improved in next release to handle multi segment traces.

- **Display Options** - In Level Hiding tab, the TLP Data Pattern type mask/match patterns specified are not currently saved. This will be corrected in coming releases.

- Known Problems and Issues Summit T3-16
  - **Auto-Configure Lane Polarity** – For correct polarity detection Summit recording settings has to be initialized before the monitored link is trained.
    If performing 8GT/s calibration the polarity results will be lost. The link has to be retrained at Gen1 or Gen2 for polarity of lanes to be recalculated or simply enter the polarity values manually.
  - **EIOS errors** – Errors found in the EIOS packets as the system goes into low power state can be expected and are to be considered a normal part of operation
  - **Trigger Position** - Trigger positioning can be off by a few (up to 6) packets in either direction due to certain real-time constraints with heavy packet loading.
    When setting a trigger such as "Enter Electrical Idle" or "Switch to ..." and the Trigger Position marker is set below 50% in the recording options dialog, the downstream direction may be missing traffic in the CATC Trace when there is a speed switch event from Gen1 to Gen2 or Gen3. This condition will be corrected in next releases.
  - **Ethernet to USB switch** - After Summit T3 has been connected to the Ethernet in the PETracer application, user should go through the process of disconnecting the unit from the network using the PETracer menu before connecting it back using USB; otherwise the next recording taken may fault the application. This issue would be addressed in coming releases.
  - **x16 Gen2 Active Interposer** – Summit T3-16 requires Active Interposer revision G or higher.
  - **Short Electrical idle periods** may not be detected by the analyzer and as a result Link Up/Link Down blocks may not appear in the trace.
  - **Functionality limitations** – Protocol trace mode no longer keeps 10-bit code symbols in the trace file. Use BitTracer mode to see scrambled/encoded symbol values.
  - **Power Off / On** – Once analyzer is powered off you need to wait at least 10 seconds before you power it back on, otherwise the analyzer may not initialize properly.
  - **Connection through USB HUB** – Summit T3 may require manual restart after BusEngine or Firmware update when it is connected to the host PC via USB Hub. Power the unit down and power it back up if software does not see the unit after the update.
  - **Gen3 Skips from Retimers** - When the SKP size is different than 130bits the SKP size displayed in the viewers may not be the exact same size as the one present in the bus. Also, the 24 bits following the SKP end symbol may not reflect actual bits in the bus, this will be noticeable in G3 Polling.Compliance and during G3 L0 if previous block is a data block.
  - **Ignore Idle Errors Option** - Currently compliance patterns, shown as PATN packets in the CATC Trace viewer, can only be filtered using the recording option “Ignore Idle Errors”. Using option “Ignore Idle Errors” may remove some training sequences just after link comes out of electrical idle.
  - **Auto Options** - Autospeed will not work properly for links already in low power states. Autoswizzle needs to see link training sequences (from configuration or recovery) in order to work. Also use fixed link width if the bus is in L0s state, this will be corrected in next releases.
  - **Low power states** - For L0s, the analyzer will filter out about 16 FTS due to lock, deskew and synchronization. If deskew is bypassed extra 3 to 4 FTS can be seen as being recovered only in bit tracer mode. During L0s low power traffic some LinkDwn/LinkUp packets might be missing from the trace when the electrical idle period is under 200ns. During L0s low power traffic some of the FTS packets may show with error marks. The PETracer tries to show as much data as possible after link comes out of electrical idle, this has the side effect of showing packets with errors until the analyzer has locked properly to the data. For L1, for devices that send less than 9 TS1s after exit of L1 these may not be recorded in the trace and sometimes deskew will be an issue if no SKP is part of the training sequence.
  - **Real Time Statistics** – Real Time Statistics does not work as described in the user manual. Analyzer must be in recording mode for Real Time Statistics to show bus activity. Currently recording with Snapshot option will cause Real Time Statistics to malfunction. This issue would be addressed in coming releases.
  - **Power Save Mode** – USB will not reconnect after automatically when host system comes back from power save mode. Perform manual connection for the analyzer or turn off the power savings mode.

- **EIOS** – When entering electrical idle during L0s, L1 or speed change, the Electrical Idle Ordered Set may be missing from the CATC trace in some recordings.
- **Negative Time Stamps** – Precision of packet timestamp is 2ns and accuracy is measured as 3.75ns. Traces may show negative idle time periodically in the trace. This is due to minor periodic adjustments in timestamp to prevent drift.
- **Interrupting USB connection** – While PETracer is running calibration do not unplug the USB cable as application may fault.
- **Manual Bus Engine/FW update** – Application may fault when performing manual update of firmware and bus engine files over Ethernet. Auto-update will work fine. This will be resolved in future releases.

- Known Problems and Issues Summit T3-8
  - **Auto-Configure Lane Polarity** – For correct polarity detection Summit recording settings has to be initialized before the monitored link is trained.
    If performing 8GT/s calibration the polarity results will be lost. The link has to be retrained at Gen1 or Gen2 for polarity of lanes to be recalculated or simply enter the polarity values manually.
  - **EIOS errors** – Errors found in the EIOS packets as the system goes into low power state can be expected and are to be considered a normal part of operation
  - **Trigger Position** - Trigger positioning can be off by a few (up to 6) packets in either direction due to certain real-time constraints with heavy packet loading.
    When setting a trigger such as "Enter Electrical Idle" or "Switch to ..." and the Trigger Position marker is set below 50% in the recording options dialog, the downstream direction may be missing traffic in the CATC Trace when there is a speed switch event from Gen1 to Gen2 or Gen3. This condition will be corrected in next releases.
  - **Ethernet to USB switch** – After Summit T3 has been connected to the Ethernet in the PETracer application, user should go through the process of disconnecting the unit from the network using the PETracer menu before connecting it back using USB; otherwise the next recording taken may fault the application. This issue would be addressed in coming releases.
  - **RTS in Cascading mode** – Real Time Statistics view does not operate properly when two Summit T3-8 units are used in cascading mode.
  - **x16 Gen2 Active Interposer** – Summit T3-8 requires Active Interposer revision G or higher.
  - **Short Electrical idle periods** may not be detected by the analyzer and as a result Link Up/Link Down blocks may not appear in the trace.
  - **Functionality limitations** – Protocol trace mode no longer keeps 10-bit code symbols in the trace file. Use BitTracer mode to see scrambled/encoded symbol values.
  - **Power Off / On** – Once analyzer is powered off you need to wait at least 10 seconds before you power it back on, otherwise the analyzer may not initialize properly.
  - **Connection through USB HUB** – Summit T3 may require manual restart after BusEngine or Firmware update when it is connected to the host PC via USB Hub. Power the unit down and power it back up if software does not see the unit after the update.
  - **Buffer Size -** The buffer capacity while using the Summit T3-8 in cascaded mode with link width option set to fixed X8/X4/X2 or X1 is less than the Summit T3-16 buffer capacity using the same link width option settings.
  - **Gen3 Skips from Retimers** - When the SKP size is different than 130bits the SKP size displayed in the viewers may not be the exact same size as the one present in the bus. Also, the 24 bits following the SKP end symbol may not reflect actual bits in the bus, this will be noticeable in G3 Polling.Compliance and during G3 L0 if previous block is a data block.
  - **Overclocking -** Only standard PCIe clocking is supported by the analyzers. No overclocking.
  - **Ignore Idle Errors Option** - Currently compliance patterns, shown as PATN packets in the CATC Tracer viewer, can only be filtered using the recording option “Ignore Idle Errors”. Using option “Ignore Idle Errors” may remove some training sequences just after link comes out of electrical idle.
  - **Auto Options** - Autospeed will not work properly for links already in low power states. Autoswizzle needs to see link training sequences (from configuration or recovery) in order to work. Also use fixed link width if the bus is in L0s state, this will be corrected in next releases.
  - **Low power states** - For L0s, the analyzer will filter out about 16 FTS due to lock, deskew and synchronization. If deskew is bypassed extra 3 to 4 FTS can be seen as being recovered only in

bit tracer mode. During L0s low power traffic some LinkDwn/LinkUp packets might be missing from the trace when the electrical idle period is under 200ns. During L0s low power traffic some of the FTS packets may show with error marks. The PETracer tries to show as much data as possible after link comes out of electrical idle, this has the side effect of showing packets with errors until the analyzer has locked properly to the data. For L1, for devices that send less than 9 TS1s after exit of L1 these may not be recorded in the trace and sometimes deskew will be an issue if no SKP is part of the training sequence.

- **Real Time Statistics** – Real Time Statistics does not work as described in the user manual. Analyzer must be in recording mode for Real Time Statistics to show bus activity. Currently recording with Snapshot option will cause Real Time Statistics to malfunction. This issue would be addressed in coming releases.
- **Power Save Mode** – USB will not reconnect after automatically when host system comes back from power save mode. Perform manual connection for the analyzer or turn off the power savings mode.
- **Update Bus Engine in Cascaded Mode** – While T3-8 unit is reinitialized after it has been updated for bus engine the PETracer application may fault for certain T3-8 units. When this happens just restart the application, the T3-8 unit was successfully updated. This issue would be addressed in coming releases.
- **EIOS** – When entering electrical idle during L0s, L1 or speed change, the Electrical Idle Ordered Set may be missing from the CATC trace in some recordings.
- **Negative Time Stamps** – Precision of packet timestamp is 2ns and accuracy is measured as 3.75ns. Traces may show negative idle time periodically in the trace. This is due to minor periodic adjustments in timestamp to prevent drift.
- **Cascaded operation** – X16 cascaded operation is not currently supported in the API or for Automated Test Script application.
- **Interrupting USB connection** – While PETracer is running calibration do not unplug the USB cable as application may fault.
- **Manual Bus Engine/FW update** – Application may fault when performing manual update of firmware and bus engine files over Ethernet. Auto-update will work fine. This will be resolved in future releases.

- Known Problems and Issues Summit T2-16
  - **External Reference Clock** – When External Reference Clock option is selected in Recording Options, Summit requires reference clock to be present at all times during the recording. Do not use this option for boot up recordings.
  - **Auto-Configure Lane Polarity** – for correct polarity detection Summit recording settings has to be initialized before the monitored link is trained. Switching between BitTracer and Protocol recordings is resetting all detected polarity settings.
  - **TLP Header with Payload match** – When both header and payload match values are used for trigger on TLP, analyzer may mistrigger on a condition when TLP with matching header and TLP with matching payload are coming back to back.
  - **Trigger Position** - Trigger positioning can be off by a few (up to 6) packets in either direction due to certain real-time constraints with heavy packet loading.
  - **EIOS errors** – Errors found in the EIOS packets as the system goes into low power state can be expected and are to be considered a normal part of operation
  - **Connectivity** – Summit T2-16 may not work correctly if connected over Ethernet and USB at the same time. Please use only one type of interface.
  - **x16 Gen2 Active Interposer** – Summit T2-16 requires Active Interposer revision G or higher.
  - **Passive Interposer** – Summit T2-16 2 meter cable option will not work reliably Passive Interposer. Use 1-meter cables.
  - **Ethernet to USB switch** – After Summit T3 has been connected to the Ethernet in the PETracer application, user should go through the process of disconnecting the unit from the network before connecting it back using USB; otherwise the next recording taken may fault the application. This issue would be addressed in coming releases.
- Known Problems and Issues PETracer Summit
  - **External Reference Clock** – When External Reference Clock option is selected in Recording Options, Summit requires reference clock to be present at all times during the recording. Do not

use this option for boot up recordings.
    - **Auto-Configure Lane Polarity** – for correct polarity detection Summit recording settings has to be initialized before the monitored link is trained. Switching between BitTracer and Protocol recordings is resetting all detected polarity settings.
    - **TLP Header with Payload match** – When both header and payload match values are used for trigger on TLP, analyzer may mistrigger on a condition when TLP with matching header and TLP with matching payload are coming back to back.
    - **EIOS errors** – Errors found in the EIOS packets as the system goes into low power state can be expected and are to be considered a normal part of operation
    - **Trigger Position** - Trigger positioning can be off by a few (up to 6) packets in either direction due to certain real-time constraints with heavy packet loading.
    - **Ethernet Connectivity** – Summit fails to work correctly if plugged directly into GigE network, works OK if plugged through 10/100 Ethernet HUB.
    - **USB support** – not supported
- Known Problems and Issues Summit T28
    - **Auto-Configure Lane Polarity** – for correct polarity detection Summit recording settings has to be initialized before the monitored link is trained.
    - **EIOS errors** – Errors found in the EIOS packets as the system goes into low power state can be expected and are to be considered a normal part of operation
    - **Trigger Position** - Trigger positioning can be off by a few (up to 6) packets in either direction due to certain real-time constraints with heavy packet loading.
      When setting a trigger such as "Enter Electrical Idle" or "Switch to ..." and the Trigger Position marker is set below 50% in the recording options dialog, the downstream direction may be missing traffic in the CATC Trace when there is a speed switch event from Gen1 to Gen2 or Gen3. This condition will be corrected in next releases.
    - **x16 Gen2 Active Interposer** – Summit T28 requires Active Interposer revision G or higher
    - **Short Electrical idle periods** may not be detected by the analyzer and as a result Link Up Link down blocks may will not appear in the trace.
    - **Overclocking -** Only standard PCIe clocking is supported by the analyzers. No overclocking.
    - **Ignore Idle Errors Option** - Currently compliance patterns, shown as PATN packets in the CATC Tracer viewer, can only be filtered using the recording option “Ignore Idle Errors”. Using option “Ignore Idle Errors” may remove some training sequences just after link comes out of electrical idle.
    - **Auto Options** - Autospeed will not work properly for links already in low power states. Autoswizzle needs to see link training sequences (from configuration or recovery) in order to work. Also use fixed link width if the bus is in L0s state, this will be corrected in next releases.
    - **Low power states** - For L0s, the analyzer will filter out about 16 FTS due to lock, deskew and synchronization. If deskew is bypassed extra 3 to 4 FTS can be seen as being recovered only in bit tracer mode. During L0s low power traffic some LinkDwn/LinkUp packets might be missing from the trace when the electrical idle period is under 200ns. During L0s low power traffic some of the FTS packets may show with error marks. The PETracer tries to show as much data as possible after link comes out of electrical idle, this has the side effect of showing packets with errors until the analyzer has locked properly to the data. For L1, for devices that send less than 9 TS1s after exit of L1 these may not be recorded in the trace and sometimes deskew will be an issue if no SKP is part of the training sequence.
    - **Gen3 Options** – PETracer application shows Gen3 options as available for selection in some of the dialogs. T28 does not support these and they will be unavailable in future releases.
    - **EIOS** – When entering electrical idle during L0s, L1 or speed change, the Electrical Idle Ordered Set may be missing from the CATC trace in some recordings.
    - **Negative Time Stamps** – Precision of packet timestamp is 2ns and accuracy is measured as 3.75ns. Traces may show negative idle time periodically in the trace. This is due to minor periodic adjustments in timestamp to prevent drift.
- Known Problems and Issues Summit T24
    - **Auto-Configure Lane Polarity** – for correct polarity detection Summit recording settings has to be initialized before the monitored link is trained.
    - **EIOS errors** – Errors found in the EIOS packets as the system goes into low power state can be

expected and are to be considered a normal part of operation
    - **Trigger Position** - Trigger positioning can be off by a few (up to 6) packets in either direction due to certain real-time constraints with heavy packet loading.
    - **x16 Gen2 Active Interposer** – Summit T24 requires Active Interposer revision G or higher
    - **Short Electrical idle periods** may not be detected by the analyzer and as a result Link Up/Link Down blocks may not appear in the trace.
    - **Overclocking -** Only standard PCIe clocking is supported by the analyzers. No overclocking.
    - **Ignore Idle Errors Option** - Currently compliance patterns, shown as PATN packets in the CATC Tracer viewer, can only be filtered using the recording option “Ignore Idle Errors”. Using option “Ignore Idle Errors” may remove some training sequences just after link comes out of electrical idle.
    - **Auto Options** - Autospeed will not work properly for links already in low power states. Autoswizzle needs to see link training sequences (from configuration or recovery) in order to work. Also use fixed link width if the bus is in L0s state, this will be corrected in next releases.
    - **Low power states** - For L0s, the analyzer will filter out about 16 FTS due to lock, deskew and synchronization. If deskew is bypassed extra 3 to 4 FTS can be seen as being recovered only in bit tracer mode. During L0s low power traffic some LinkDwn/LinkUp packets might be missing from the trace when the electrical idle period is under 200ns. During L0s low power traffic some of the FTS packets may show with error marks. The PETracer tries to show as much data as possible after link comes out of electrical idle, this has the side effect of showing packets with errors until the analyzer has locked properly to the data. For L1, for devices that send less than 9 TS1s after exit of L1 these may not be recorded in the trace and sometimes deskew will be an issue if no SKP is part of the training sequence.
    - **Gen3 Options** – PETracer application shows Gen3 options as available for selection in some of the dialogs. T24 does not support these and they will be unavailable in future releases.
    - **EIOS** – When entering electrical idle during L0s, L1 or speed change, the Electrical Idle Ordered Set may be missing from the CATC trace in some recordings.
    - **Negative Time Stamps** – Precision of packet timestamp is 2ns and accuracy is measured as 3.75ns. Traces may show negative idle time periodically in the trace. This is due to minor periodic adjustments in timestamp to prevent drift.
- Known Problems and Issues Summit Z3-16
    - **Wait=time** - Wait = time instruction may disable execution of subsequent wait instructions. To avoid this use wait on TLP with corresponding timeout.
    - **Bus engine update using USB HUB** – When updating the bus engine image while the host machine is connected to the Z3 through a USB HUB the PETracer application may keep waiting more than a minute for Z3 to restart. If this happens, simply unplug and plug back the USB cable. Another solution to this problem is to connect Z3 directly to the host machine USB port rather than through a HUB.
    - **Using Z3 with T3 Analyzer** – At 8 GT/s rate, Preset 7 is the default for TX Emphasis in the Generation Options for all lanes in the Summit Z3 Trainer. When using a Summit T3 to analyze the traffic, the DC Gain must be set to 3 dB in the Probe setting dialog on all the lanes for the traffic direction from the Z3 trainer. If you need to calibrate the link, select only the direction to be calibrated and skip the direction from the Z3 since that portion will be clean using the suggested DC Gain setting.
    - **ACK Latency** – Z3 will acknowledge a TLP after a minimum of 1 microsecond, this may more than the latency timeout for some devices in some configurations, a replay of the TLP may be generated by the DUT.
    - **Go to Link State drop down list** – When Emulation Role is selected as Device, the options Hot Reset and Disabled should not be used. This menu will change in future releases to make only valid options available per role selected.
    - **Sending TLPs after Speed Change command when using scripts** – Add a command to wait for the link to be ready after a speed switch command and before transmitting any other packets.
    - **PERST# Assertion** : This signal can be driven per user command in both Host and Device modes. When the Z3 Trainer is plugged in to a host system and in Device Mode, do not run a script to drive PERST#.
    - **Script Automation Test Tool Maximum LinkWidth** – ATS will run compliance tests only at X1.

Future releases will enable higher link width operation again.
    - **Script Automation Test Tool Root Complex Test Group** – Test 41-20 may fail for systems. This will be corrected in future releases.
- Known Problems and Issues Summit Z2-16
    - **Wait=time** - Wait = time instruction may disable execution of subsequent wait instructions. To avoid this use wait on TLP with corresponding timeout.
    - **Manual Ack/NAK mode** – operation of manual Ack/NAK mode is not reliable.
    - **Connection through USB HUB** – Summit T3 may require manual restart after BusEngine or Firmware update when it is connected to the host PC via USB Hub. Power the unit down and power it back up if software does not see the unit after the update.

3.4. API

Automation:

- There are several sample projects included with the application. To run them, you should make sure that the PCIe Protocol Suite application is already installed.
- The library file name to be used is: ***PEAutomation.tlb***.
- **HTML Sample:**
- For editing the HTML sample code you can use a text editor or other HTML-editing tools.
- **CPP sample:**
    1. To compile the Visual C++ sample project you first need to install the Microsoft Visual Studio.
    2. You can select to install the PCIe Protocol Suite software in a directory different than the default one. If you choose to do so, make sure you add a path to the installation directory in your project's paths list. You can find the ***PEAutomation.tlb*** file in the installation directory. When using Microsoft Visual Studio, the path to the installation directory should be added to the following places in the 'Project Settings' property sheet:
        (1) Under 'C/C++' tab, 'Preprocessor' category in the 'Additional include directories'.
        (2) Under 'Resources' tab, in the 'Additional resource include directories'.
- When a remote server is disconnected abruptly while a client application is still connected, the client application might hang up for several minutes. At the end of this timeout, the client would be released with a "The RPC server unavailable" notification. This is due to Windows conduct. [C0004997]

4. Previous Releases

The following is a summary of previous releases of PCIe Protocol Suite and PETracer™:

4.1. Version 6.75 version

- New functionality added to Summit T3-16, T3-8 and T28: Five DW floating payload match.
- PQI 6i decode for CATC Trace viewer.
- SATA 2.6 decode for CATC Trace viewer.
- Improvements to Automated Test Script.
- Enhancements to API.
- Bug fixes.
- Last release supporting Edge, ML and EML products.

4.2. Version 6.71 version

- AHCI 1.3 decoding improvements.
- PQI dialog box updates.

- PQI decoding: XML Export/Import.
- AHCI Sample scripts for Summit Z3.
- Bug fixes.

4.3. Version 6.70

- Added support for Summit T24 analyzer.

4.4. Version 6.65

- Improved memory efficiency for Summit T3 recordings.
- SSD protocol decoding improvements.
- Bug fixes.

4.5. Version 6.63

- Improved memory efficiency for x1, x2, x4 recordings for Summit T3-16.
- NVMe protocol decoding improvements.

4.6. Version 6.60

- AHCI 1.3 decoding support.
- PQI decoding support.
- Dashboard view is enhanced with additional link information.
- CATC Walk support added.
- Summit T3 calibration procedure improvements.
- Host memory spaces support for Summit Z3.
- Summit Z3 NVMe device emulation support added.

4.7. Version 6.53

- Dashboard functionality for Summit T3-8, Summit T3-16 and Summit T28.
- Real Time Statistics display is fixed.

4.8. Version 6.51

- Cascading Recording support for Summit T3-8 is fixed
- Real Time Statistics display is fixed

4.9. Version 6.50

- Added support for CrossSync in Summit T28
- The software application now supports the connectivity of multiple LeCroy PCIe analyzers
- Added support for L0s/L1 LTSSM states on Summit Z3
- Added support for Summit T28 calibration

4.10. Version 6.45

- Support for Real Time Statistics (RTS) on Summit T3-8/T3-16
- Support for CrossSync on Summit T3-8/T3-16 (restricted to operation with other LeCroy analyzer, but not additional PCIe products)
- Support for ATS (Address Translation Services)

4.11. Version 6.40

- Summit T28 Analyzer support
- Summit T3-8 Cascading support

4.12. Version 6.30

- Summit T3-8 Analyzer support
- Summit Z3-16 Exerciser full gen3 support

4.13. Version 6.23

- Summit T3 support for AutoSwizzling
- NVMHCI transaction decoding
- Summit Z3 support for script based generation at gen1 and gen2 speeds
- New Summit Z3 LTSSM control dialog
- Bug fixes

4.14. Version 6.2

- Summit T3 Advanced Triggering options added.
- Bug Fixes

4.15. Version 6.1

- Added support for Summit Z3-16 PCI Express exerciser product.

4.16. Version 6.0

- Added support for Summit T3-16 PCI Express analyzer product.

4.17. Version 5.73

- Bug Fixes

4.18. Version 5.72

- ProtoSync support added. ProtoSync allows PETracer to import data from LeCroy scopes and synchronize protocol views with the scope waveform.
- TraceView packet selection implemented.
- Bug Fixes

4.19. Version 5.71

- Added support for Atomic Operations
- Added support for TLP Processing Hints
- BitTracer functionality is enhanced with speed information, Ordered Set color coding and packet statistics
- Added support for PCI Express 3.0 specification packet decoding
- Bug Fixes

4.20. Version 5.70

- Configuration space decoding is compliant with PCI Express specification 2.1
- Bug Fixes

4.21. Version 5.62

- Summit trigger on MR-IOV TLP packets support added
- Summit traffic based RealTime Statistics graphs added
- Summit x8 filtering issues are fixed
- Bug fixes

4.22. Version 5.61

- Summit T2-16 USB problems are fixed.
- Summit T2-16 and Summit Auto Link Width tracking support added.
- Summit T2-16 and Summit ability to record low power states and speed switch transitions improved.
- Summit T2-16 and Summit start tracking lane polarity inversion right after power on, without a requirement of being configured to do so by the software.
- Summit T2-16 and Summit false Trigger on Errors are fixed.
- Auto Update feature included, PETracer software can be configured to check for updated version automatically.
- Summit Z2-16 support for multi-TLP waits added
- Summit Z2-16 number of supported branches increased to 32.
- Summit Z2-16 scripting extension to support arithmetic operations with counter variable within the Repeat block for the Address Space Offset parameter of the Field/Payload Substitution construct

4.23. Version 5.6

- Summit Z2-16 Fast Transmit functionality added
- Summit Z2-16 Memory Completer functionality added
- Summit Z2-16 Ethernet support added
- Multiple Summit Z2-16 bug fixes
- PETracer Summit and Summit T2-16 stability improvements
- Edge T1-4 support added.
- MR_IOV Trace view decoding added. Please note that other views are not updated and may display incorrect information for MR-IOV packets.

4.24. Version 5.5

- Summit Z2-16 Gen 2 exerciser released.

4.25. Version 5.4

- Added support for Summit T2-16 analyzer.

4.26. Version 5.3

- PETracer Summit support of Automatic receiver Calibration to ensure error free recordings is introduced.
- DataFlow View is added as an additional method of analyzing PCI commands.
- Bug fixes

4.27. Version 5.21

- Maintenance expiration check in PETracer 5.2 is fixed.

4.28. Version 5.20

- Summit Bit Tracer recording is released
    - Logic Analyzer style time based view
    - Simple triggering on 10bit symbol
    - Embedded packet view
    - Apply different Link parameters to the view (lane skew, link width, polarity, lane swizzling, scrambling settings)
    - Export to CATC trace
- Compact view functionality added
- LTSSM Flow graph functionality added

4.29. Version 5.10

- PETracer Summit support
    - Gen1/Gen2 recordings at x1, x2, x4, x8 and x16 lane widths
    - 8GB Recording Buffer
    - MidBus Probe support
    - Ethernet connectivity

4.30. Version 5.00

- PETracer Edge support
- PCI Express specification 2.0 support at Gen1 speeds.
- New Trace file format that provides smaller files and faster operation. Old traces can be automatically converted to the new format on open.
- “Simple Mode” is added to Recording Options for quick triggering and filtering setup
- More Errors are tracked in the Error summary
- Improved display of Ordered Sets
- New BusEngine for PETracer ML fixes the problem with the analyzer not always being able to lock to the data after power cycling of the DUT
- Bug fixes

4.31. Version 4.60

- PETrainer EML x2 support
- Bug fixes

4.32. Version 4.50

- Support for PETracer™ analyzer based on UPAS 2500 discontinued
- Combined TLP Header / Payload trigger resource
    - No more stand-alone payload resource
    - Each TLP resource has payload resource attached to it
    - ML payload resource includes offsets now (same as EML)
- Added Metrics functionality for performance analysis including
    - in Trace Display for metrics data for Link and Split transactions
    - Timing calculation display for metrics based data
    - Bus Utilization graphs for metrics data
    - Traffic summary tables for metrics data
- Improved Timing calculation providing data for
    - Link Utilization
    - Time Coverage
    - Bandwidth
    - Data Throughput
    - Packets per second
    - Split Transaction performance (metrics)
- Export to CSV
- Hiding Toolbar is redesigned to provide faster access to most common hiding usage
- Search dialog changes, it is possible to specify search direction for every search type
- VSE is updated to include Metrics data and Split transaction data
- Trace Navigator Improvements
    - new look
    - legend with selectable color, priority, show/hide
- User selectable sample rate for averaging Bus Utilization graphs
- Copy packet to PETrainer generation script format added
- Introduction of Named features for ML Trainer/Tracer

4.33. Version 4.40

- PETracer ML:
  Includes various bug fixes
- PETracer EML:
  Includes various bug fixes
- PETrainer EML:
  - Add Memory and IO Transaction Handler:
    - Provides automatic response to memory and IO transactions
    - When enabled, the PETrainer EML will process incoming Transaction requests such as MemRd, MemWr, IoRd, and IoWr. This includes taking the data from the write operations and placing it into a scratchpad memory. Later access to this scratchpad memory via MemRd or IoRd will result in the PETrainer EML creating appropriate CplD packets with correct data read from the scratchpad.
    - One 64 bit memory space, Two 32 bit memory spaces, and two IO spaces can be configured through the PETracer Application or through programming of Configuration space base address registers.
    - 512MB of scratchpad memory available for the 64 bit addressable memory space
    - 128MB of scratchpad memory available for each 32 bit addressable memory space
    - 128 Bytes of scratchpad memory available for each IO space
    - User will be able to preload these memory spaces through the PETracer GUI using an integrated Hex editor or by loading a user binary file.
    - User will be later able to read each scratchpad memory space and verify what changes were made.
- PETrainer ML:
  - Add Script branching support
    - User will have up to 4 levels of script branching
    - Each script branch will support 1 loop counter
- Software:
  - Verification Script Engine added
  - PETrainer script language extensions
  - Automation API is expanded
  - Hex Editor for PETrainer scratchpad memory
  - Flow Control Credit checker

4.34. Version 4.31

- Operating system Support change
  - PETracer Software now only supports Windows 2000 or Windows XP
- PETracer ML:
  - Enhanced sequencer support with new “Recording Rules”
- PETracer EML:
  - Includes bug fixes related to packet filtering
- PETrainer EML:
  - Added support for x16 lane widths
  - Includes bug fixes related to the replay buffer
  - Includes bug fixes related to polarity inversion
  - Includes bug fixes related to low power states
- PETrainer ML:
  - Supports auto insertion of Tag numbers into TLP packets
  - Includes bug fixes related to intermittent NAK
  - Includes bug fixes related to low power states

4.35. Version 4.21

- PETrainer EML:
    - Added support for the new PETrainer EML hardware platform
    - Supports x1, x4, and x8 lane widths
    - Supports Script branching with up to eight separate branches
    - Supports auto insertion of Tag numbers into TLP packets

4.36. Version 4.20

- PETracer EML:
    - Advanced Sequencer support
- PETracer ML:
    - Repeat Upload in 2 PETracer ML setup is fixed.
    - Partial uploading is implemented
- Software:
    - Search and Hide capabilities are improved.
    - Additional data is available for File Based Decoding parsing.
    - Fixed application faults related to Link Tracker window browsing
- PETrainer ML Fixes:
    - Generator scripting language is enhanced.
    - New generator control bar is implemented.

4.37. Version 4.11

- PETracer EML Bug Fixes:
    - False CRC Triggers under high bandwidth traffic for x16 lane widths has been fixed.
    - Recording corruption after link disconnect event has been fixed.
    - Various problems related to recording the Link training process have been resolved.
    - Fixes false CRC errors in the trace due to trace memory timing bugs
- PETracer ML Bug Fixes:
    - Recording corruption after link disconnect event has been fixed.
    - Various problems related to recording the Link training process have been resolved.
- Software Fixes:
    - Reduced memory requirements for uploading from 512MB to 128 MB
    - Fixed uploading problems with PETracerML in x8 configuration
    - Fixed application faults related to Link Tracker window browsing
- PETrainer ML Fixes:
    - Fixed issues with occasional running of incorrect script

4.38. Version 4.10

- PETracer EML supports all lane widths including x1, x2, x4, x8, and x16
- PETrainer ML supports looping instructions
- PETrainer ML has improved ACK latency, which will prevent replay timers from expiring on users devices
- Automation API added to allow control of PETracer application from other applications
- Partial upload and re-upload functionality added to PETracer products.
- PETracer ML has improved support for recording L0s to L0 transitions.

4.39. Version 4.00

- Added support for PETracerEML product on the UPAS100K platform
    - x16 Traffic Recording – PETracer EML now supports recording of full duplex x16 PCI Express traffic.
    - Enhanced TS1 and TS2 Triggers – PETracer EML supports trigger and filtering based on modifier bits in the training sequences such as Hot Reset, Disable Link, Loop back, and Disable Scrambling.

- Multi Segment Trace Uploading – Allows the user to segment the recording into smaller traces during uploading. This is necessary for support of the 8GB trace memory in the UPAS100K platform.

4.40. Version 3.02

- Fixes known application faults.

4.41. Version 3.01

- This version fully supports PETracer, PETracer ML, and PETrainer ML
- Link Training improved for PETrainer ML
- Wait command now works correctly for PETrainer ML
- Auto configuration of Link Settings now works correctly for PETrainer ML

4.42. Version 3.0

- This is the first version of the PETracer application that supports the PETrainer ML.
- Although this version does permit control of both PETracer AND PETrainer products, it is not meant to be used for PETracer only customers. Not all configurations have been fully tested for the PETracer. For best results, PETracer should be controlled through separate Host PC using PETracer software Version 2.10.

5. Support

Online Download

Please periodically check Teledyne LeCroy Protocol Solutions Group's web site for software updates and other support related to this product. Software updates are available to those users with current Maintenance Agreements.

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